

Targeting workload to ameliorate risk of heat stress in industrial sugarcane workers¹

by Rebekah Al Lucas,² Bethany D Skinner, Esteban Arias-Monge, Kristina Jakobsson, Catharina Wesseling, Ilana Weiss, Scarlett Poveda, Fatima I Cerda-Granados, Jason Glaser, Erik Hansson, David H Wegman

1. Supplementary material
2. Correspondence to: Rebekah Al Lucas, School of Sport, Exercise and Rehabilitation Sciences, University of Birmingham, Edgbaston, Birmingham, B15 2TT, United Kingdom. [E-mail: r.a.i.lucas@bham.ac.uk]

Appendix 1: Work shift context and physiological workload based on heart rate (HR) for the eight observed jobs during the 2020 harvest (H3). Burned cane cutters (n=40, across two work days), seed cutters (n=60, across three workdays), drip irrigation repair workers (n=39, across two work days), semi-mechanised seeders in dry soil (n=15, one work day), semi-mechanised seeders in moist soil (n=19, one work day), gravity irrigators (n=9, across two work days), semi-mechanised reseeders (n=40, across two work days), and weeders (n=20, one work day). Workers performing semi-mechanised seeding in moist soil had shorter evening shifts, often with no rest periods. Gravity irrigation workers had no discernible rest periods for the two observed workdays in H3. Data presented as mean [95% confidence intervals].

	Work shift duration	Rest periods		Work periods		Average %HR _{max} , work periods
	Mean (95% CI)	Mean (95% CI)		Mean (95% CI)		Mean (95% CI)
	hours	#	mins	#	mins	%
Burned cane cutters	05:38 (05:31–05:45)	5 (5–5)	14 (13–15)	6 (6–6)	40 (39–42)	64 (62–65)
Seed cutters	06:39 (06:25–06:52)	5 (5–5)	14 (13–16)	6 (6–6)	51 (48–53)	63 (62–64)
Drip irrigation repair workers	07:41 (07:39–07:43)	5 (5–6)	12 (11–13)	6 (6–7)	59 (53–65)	53 (51–54)
Semi-mechanised seeders in dry soil	06:39 (06:04–07:13)	6 (5–6)	10 (9–11)	7 (6–7)	49 (46–52)	68 (66–71)
Semi-mechanised seeders in moist soil	03:40 (03:32–03:47)	-	-	-	-	-
Gravity Irrigators	09:44 (08:36–10:52)	-	-	-	-	-
Semi-Mechanised reseeders	07:48 (07:38–07:58)	5 (4–5)	10 (10–11)	6 (5–6)	71 (66–76)	54 (52–56)
Weeders	07:29 (07:21–07:37)	5 (4–5)	18 (14–22)	6 (5–6)	59 (53–64)	57 (55–59)

Appendix 2: The percentage of the work shift and the average time spent at different work intensities (%HR_{max}) across a workday (inclusive of work and rest periods) for the eight observed jobs during the 2020 harvest (H3). Data presented as mean [95% confidence intervals].

	Light (<50 %HR _{max})		Light – Moderate (51-60 %HR _{max})		Moderate (61-70 %HR _{max})		Hard (71-80 %HR _{max})		Very Hard (81-90 %HR _{max})		Maximal (91-100 %HR _{max})	
	Mean (95% CI)		Mean (95% CI)		Mean (95% CI)		Mean (95% CI)		Mean (95% CI)		Mean (95% CI)	
	%	mins	%	mins	%	mins	%	mins	%	mins	%	mins
Burned cane cutters	26 (22–29)	87 (74–99)	24 (20–28)	80 (67–94)	37 (32–42)	125 (107–143)	12 (8–17)	42 (27–56)	1 (0–3)	4 (0–9)	0 (0–0)	0 (0–0)
Seed cutters	23 (20–26)	87 (76–98)	31 (27–35)	117 (102–132)	32 (28–35)	127 (111–144)	14 (10–17)	61 (45–78)	1 (0–2)	6 (2–10)	0 (0–0)	0 (0–1)
Drip irrigation repair workers	46 (38–55)	215 (173–257)	39 (33–45)	180 (153–207)	13 (8–18)	58 (35–81)	2 (0–3)	8 (3–13)	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)
Semi-mechanised seeders in dry soil	7 (4–10)	27 (15–40)	16 (13–20)	63 (51–75)	41 (32–49)	161 (123–199)	31 (20–42)	127 (77–177)	5 (1–9)	20 (5–36)	0 (0–0)	0 (0–0)
Semi-mechanised seeders in moist soil	18 (12–23)	41 (29–52)	16 (11–21)	35 (24–45)	28 (22–34)	61 (46–76)	31 (22–41)	68 (47–88)	7 (2–12)	15 (5–25)	0 (0–1)	1 (0–2)
Gravity irrigators	60 (40–81)	363 (220–506)	31 (17–45)	174 (100–248)	8 (2–15)	43 (10–76)	1 (0–1)	4 (1–7)	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)
Semi-mechanised reseeders	38 (29–48)	182 (136–228)	38 (32–44)	178 (151–206)	20 (22–34)	93 (62–123)	3 (1–5)	14 (6–22)	0 (0–1)	1 (0–3)	0 (0–0)	0 (0–1)
Weeders	31 (21–41)	142 (97–186)	43 (38–48)	192 (169–215)	21 (15–28)	95 (67–124)	4 (2–6)	19 (10–27)	0 (0–1)	2 (0–5)	0 (0–0)	0 (0–0)

